87. $f^4(x) = e^{\sin x}$

3rd deg Taylor $[0,1]$

$$\epsilon < \left| \frac{M(x-a)^{n+1}}{(n+1)!} \right|$$

M is max of $f^{n+1}(x)$

$n = 3$

$$\epsilon < \left| \frac{M x^4}{4!} \right|$$

M is max of $f^4(x)$

M is max of $e^{\sin x}$ $[0,1]$

$M = e^{\sin 1}$

$$< \frac{e^{\sin 1} \cdot 1^4}{4!}$$

Apr 13-9:31 AM

86 $p(x) = (x-3)^2 - \frac{(x-3)^4}{2!} + \dots \frac{(-1)^{n+1}(x-3)^{2n}}{n!} \dots$

$f^{30}(3) = ?$

$\frac{f^n(a)(x-a)^n}{n!}$

$$\frac{f^{30}(3)(x-3)^{30}}{30!} = \frac{1 \cdot (x-3)^{30}}{15!}$$

$$\frac{f^{30}(3)}{30!} = \frac{1}{15!}$$

$$f^{30}(3) = \frac{30!}{15!}$$

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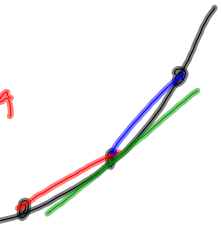
83.

x	2.5	2.8	3.0	3.1
$f(x)$	31.25	39.20	45	48.05

$f'(3) = ?$



LHDQ $\frac{45-39.2}{3.0-2.8} = 29$

RHDQ $\frac{48.05-45}{3.1-3.0} = 30.5$

~~50Q~~

Apr 13-9:54 AM

Review 22 Differential Equations

Solve: $\frac{dy}{dx} =$ ~~~

given initial conditions (x_0, y_0)

find $y =$ ~~~

↑ integrate $\frac{dy}{dx}$

use init. cond. to find C

find final conditions (x_n, y_n)

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solve

$\frac{dy}{dx} = \cos(2x)$ $\quad y(0) = 1$

$y = \frac{1}{2}\sin(2x) + C$

$1 = \frac{1}{2}\sin(0) + C$

$1 = C$

$y = \frac{1}{2}\sin(2x) + 1$

find $y(\frac{\pi}{3})$

$y = \frac{1}{2}\sin(\frac{2\pi}{3}) + 1$

$y = \frac{1}{2} \cdot \frac{\sqrt{3}}{2} + 1$

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$\frac{dy}{dt} = .05\,y$ $\quad$ when $t=0$, $y=10$

when $t=20$ $y=?$

sep. var.

$\frac{dy}{y} = .05\,dt$

$\int \frac{dy}{y} = \int .05\,dt$

$\ln|y| = .05t + c$

$|y| = e^{.05t+c}$

$y = e^{.05t} \cdot e^{c} = Ae^{.05t}$

Init cond $\quad 10 = Ae^{0} = A$

$y = 10e^{.05t}$

$y(20) = 10e^{.05 \cdot 20} = 10e$

Apr 13-10:12 AM

$\frac{dy}{dx} = \sin(x^2)$ init. $y(0) = 1$

final $y(4) = ?$

$\int \sin(x^2)\,dx$

final = initial + displacement

$= 1 + \int_0^4 \sin(x^2)\,dx$

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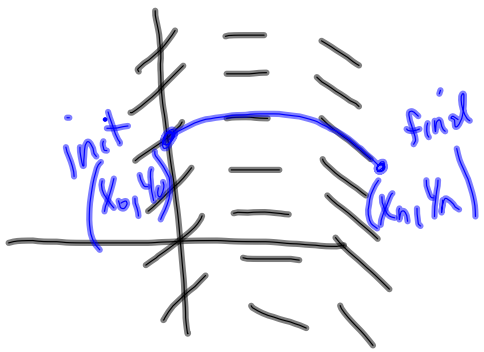
Euler's method

	x	y	y'
initial	x_0	y_0	
	$\vdots$		
final	x_n	y_n	

slope field



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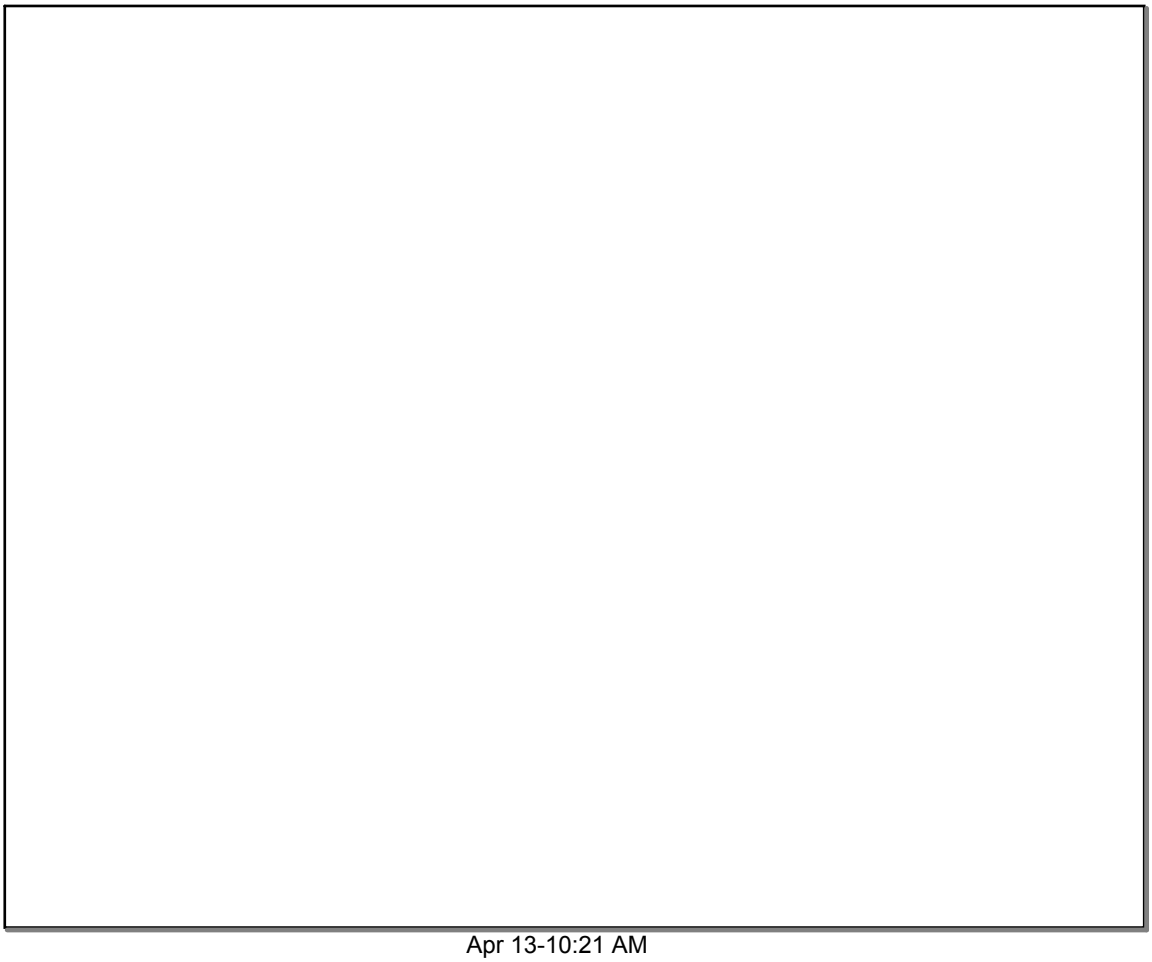

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